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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/607,612	06/27/2003	Helene Del Puppo	LAM2P413	8025

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EXAMINER

TRAN, BINH X

ART UNIT	PAPER NUMBER
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1765

DATE MAILED: 07/20/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/607,612

Applicant(s)

PUPPO ET AL.

Examiner

Binh X. Tran

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 May 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) 15-18 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-14 and 19-28 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☒ Claim(s) 1-28 are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 January 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 10/26/04; 10/25/04.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of Group I (claims 1-14, 19-28) in the reply filed on 5-2-2005 is acknowledged.
2. Claims 15-18 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 5-2-2005.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.
4. Claims 19-28 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claims 19, 21-22, 25, "a thin layer of a silicon containing oxide" (emphasis added) is subjective and indefinite. It is unclear from the claims, what specific thickness range that applicants consider as "thin".

Claims 20-28 are indefinite because they directly or indirectly depend on indefinite claim 19.

Claim Rejections - 35 USC § 102

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5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 9-13 are rejected under 35 U.S.C. 102(b) as being anticipated by Olson et al. (US 5,705,433).

Respect to claim 9, Olson discloses a method for reducing etch rate micro-loading between different doped material of a substrate (col. 3 lines 1-5) comprising:

striking a plasma in a chamber (Fig 2);

etching the substrate;

forming a passivation layer (i.e. sidewall protection layer) from byproducts generated from the etching (col. 3 lines 11-25);

enhancing the passivation layer (col. 3 lines 25-47).

Respect to claim 10, Olson discloses enhancing the passivation layer includes flowing silicon-containing gas into the chamber during the etching (col. 3 lines 25-35, col. 4 lines 10-11). Respect to claim 11, Olson discloses the flow rate of silicon containing gas is 16 sccm (col. 4 lines 10-11, read on applicants' range). Respect to claim 12, Olson discloses the silicon containing gas including silane, higher silane, (i.e. disilane aka Si_2H_6), SiH_2Cl_2 (col. 3 lines 6-10). Respect to claim 13, Olson discloses the different doped materials includes doped or undoped material (col. 3 line 1).

7. Claims 19-26, 28 are rejected under 35 U.S.C. 102(b) as being anticipated by Becker et al. (US 5,094,712).

Respect to claim 19, Becker discloses a method for enhancing polysilicon (13) to oxide (14) selectivity during an etching process, comprising:

providing a substrate to be plasma etched in a chamber;

striking a plasma in the chamber (col. 8 lines 51-67);

depositing a layer of a silicon containing oxide over a gate oxide (14) as the substrate is being etched (col. 9 lines 1-13).

Respect to claims 20, 23-24, Becker discloses flowing a SiCl_4 into the chamber while performing an over etch step of the etching process (col. 8 lines 60-62). Respect to claims 21, 22, Becker discloses depositing a SiO_2 over a gate oxide (14) as the substrate being etched during the over etch step, this causes a polysilicon to oxide selectivity to increase so as to prevent any etching of the gate oxide (Fig 4, col. 9 lines 2-13). Respect to claims 25-26, 28, Becker teaches to provide O_2 from an oxygen gas feed source for forming the SiO_2 (col. 9 lines 3-10).

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation

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under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

10. Claims 1-3, 5-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chow et al. (US 6,872,322) in view of Olson et al. (US 5,705,433).

Respect to claim 1, Chow (6,872,322) discloses a method for etching a polysilicon gate structure in a plasma etch chamber comprising:

- defining a pattern (i.e. resist pattern 28) protecting a polysilicon film (24) to be etched (Fig 1a);

- striking a plasma;

- etching substantially all of the polysilicon film that is unprotected using a first gas composition (i.e. main etch, col. 13-14; Table 1, Table 2);

- introducing a second gas composition;

- etching a remainder of polysilicon film while introducing a second gas composition (over etch gas composition, See Table 1-2).

Chow fails to disclose that silicon containing gas is used during the over etch step. In a semiconductor process, Olson teaches to use silicon containing gas during the over etch step in order to improve sidewall protection (col. 3, col. 5 lines 1-2). It would have been obvious to one of ordinary skill in the art at the time of the invention, to modify Chow in view of Olson by using silicon-containing gas because it will improve sidewall protection.

Respect to claim 2, Olson discloses the flow rate of 16 sccm for silicon containing gas (read on applicant's range, See col. 4 lines 9-11). Respect to claim 3, Olson teaches to use silane, higher silane (read on Si_2H_6), SiH_2Cl_2 (col. 3 lines 6-10).

Respect to claim 5, Chow teaches to execute an etching step to remove a hard mask (i.e. silicide layer 22, See Table 1-2) and execute another etch step to remove the polysilicon film (24) that is unprotected. Respect to claim 6, Olson teaches to prevent notching at a base of the polysilicon gate structure (abstract, col. 3 lines 16-20).

Respect to claim 7, Chow teaches to terminate the etching of the polysilicon film that is unprotected (i.e. terminating the main etch process) and striking an over etch plasma (Table 1-2).

Respect to claim 8, Olson teaches to form a passivation layer from the byproducts generated from the etching of the polysilicon film in order to protect the side all. (col. 3 lines 12-25). It would have been obvious to one of ordinary skill in the art at the time of the invention, to modify Chow in view of Olson by using silicon-containing gas because it will improve sidewall protection.

11. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chow and Olson as applied to claim 1 above, and further in view of Becker.

Respect to claim 4, Chow and Olson fail to disclose to use SiCl_4 for etching the polysilicon film. However, Olson clearly teaches to use silicon containing gas includes gas that capable of producing silicon species such as SiCl , SiCl_2 and other silicon containing compound (col. 3 lines 5-10, 30-33). Becker teaches to use silicon-containing gas such as SiCl_4 for etching the polysilicon material in order to enhance

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selectivity (col. 8 lines 60-67). It would have been obvious to one having ordinary skill in the art, at the time of invention, to modify Chow and Olson in view of Becker by using SiCl_4 because it will enhance the selectivity of polysilicon with respect to oxide layer.

12. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Olson as applied to claim 9 above, and further in view of Becker (US 5,094,712).

Respect to claim 4, Olson fails to disclose the use of SiCl_4 for etching the polysilicon film. However, Olson clearly teaches to use silicon containing gas includes gas that capable of producing silicon species such as SiCl , SiCl_2 and other silicon containing compound (col. 3 lines 5-10, 30-33). Becker teaches to use silicon-containing gas such as SiCl_4 for etching the polysilicon material in order to enhance selectivity (col. 8 lines 60-67). It would have been obvious to one having ordinary skill in the art, at the time of invention, to modify Olson in view of Becker by using SiCl_4 because it will enhance the selectivity of polysilicon with respect to oxide layer.

13. Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over Becker (US 5,094,712) as applied to claim 26 above, and further in view of Gardner et al. (US 6,743,688).

Respect to claim 27, Becker fails to teach that the oxygen source for the silicon containing oxide (i.e. SiO_2) is the quartz component. However, Becker clearly teaches to form SiO_2 oxygen source (col. 9 lines 5-10). In a semiconductor process, Gardner teaches to form silicon oxide by placing the substrate in quartz boat (col. 4 lines 20-24, col. 6 lines 9-22). It would have been obvious to one having ordinary skill in the art, at the time of invention, to modify Becker in view of Gardner by using quartz boat to form

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silicon oxide because equivalent and substitution of one for the other would produce an expected result.

Conclusion

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Binh X. Tran whose telephone number is (571) 272-1469. The examiner can normally be reached on Monday-Thursday and every other Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on (571) 272-1465. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Binh Tran

Binh X. Tran